

Pathology in the Era of Web 2.0

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Key Words: Web site; Web 2.0; Internet; Social software; Continuing education; Communities of practice

DOI: 10.1309/AJCPEC9FZSB4DEDH

Abstract

In the past few years, the term Web 2.0 has become a descriptor for the increased functionality of Web sites, including those with medical content. Most physicians do not know what Web 2.0 means or how it can impact their work lives. This review provides some background on the evolution of Web 2.0 and describes how its features are being incorporated into medical Web sites. Some potential applications of Web 2.0 in pathology and laboratory medicine are discussed, as are the issues that must be considered when adopting this new technology.

None of us is as smart as all of us.
—Japanese proverb

You may have heard about the Web sites Facebook and Twitter. Perhaps you have read entries in Wikipedia or watched videos on YouTube. Each of these Web sites has a different purpose, but all of them enhance communication and information sharing among a network of users through the exchange of text, images, sound, and video. These features, and the environment of collaboration that they create, are referred to as *Web 2.0*.

The term Web 2.0 was coined at the beginning of the decade by Internet experts in the Silicon Valley and was popularized in an online article.¹ Since then, the 2.0 suffix has been applied to many fields, including medicine² and pathology.³ The concept has gained momentum, and the second Medicine 2.0 conference was held in Toronto in 2009.⁴

These days, the “2.0” label is used to leave the impression of something new and improved—a better version of the Web. But how significant is Web 2.0 for pathologists, and how will it change dialogue and collaboration in medicine in the years ahead?

Characteristics of Web 2.0

According to a number of authors,⁵⁻⁹ Web 2.0 is defined by the following attributes:

- Social software that allows people to interact online
- Information shared in an open and transparent way
- Support of wisdom of the group rather than wisdom of the few

- Content brought to the user instead of the user having to search for it

To learn more about Web 2.0, take a look at some of the more popular sites ■ **Table 1**.

Medical Sites With Web 2.0 Features

A number of medical Web sites use Web 2.0 technologies. A few representative examples are given in ■ **Table 2**. Several of these sites are described in the following text in greater detail to demonstrate how Web 2.0 features support consultation, education, and publication in medicine.

Ganfyd

Ganfyd (which stands for Get A Note From Your Doctor; <http://www.ganfyd.org>) is “The free medical knowledge base that anyone can read and any registered medical practitioner may edit. Ganfyd is a collaborative medical reference by medical professionals and invited non-medical experts.” The format and appearance of Ganfyd are similar to Wikipedia, the popular online encyclopedia that contains entries on nearly 2 million subjects. Ganfyd content is organized into medical and surgical specialties, primary care, and a number of other categories. The section on laboratory-based specialties is subdivided into standard disciplines within pathology and laboratory medicine, with a total of 380 entries. Click on a specialty to see a series of alphabetically arranged articles from that field.

The Help:Contribute page contains instructions on how to edit or create an article. To register, a person must be a qualified physician from the United Kingdom, Canada, New Zealand, or Australia, making this an expert-moderated site.

Health Education Assets Library

The mission of Health Education Assets Library, or HEAL (<http://www.healcentral.org>), is to “...provide free digital resources of the highest quality that meet the needs of today’s health sciences educators and learners.” It contains images, animations, case studies, and other resources that

medical educators may find useful in preparing teaching materials. The site has 2 codirectors, a review panel, librarians, programmers, and an advisory board. Registered users can submit content for inclusion.

An open peer review process allows any user to review and comment on submissions. The reasons for moving to open peer review, taken verbatim from the Web site, are as follows: (1) a more democratic review process that encourages active involvement of a community of users, (2) a continuous quality assurance mechanism that may identify obsolete material submitted in the past, (3) improvement of the turn-around time between submission and publication, (4) large volume of submissions, (5) substantial cost savings.

The database currently houses 22,427 resources. A search of the term “pathology” returned 12,266 results.

New England Journal of Medicine

The *New England Journal of Medicine* (NEJM; <http://nejm.org>) was founded in 1812 as a quarterly called *The New England Journal of Medicine and Surgery*. For nearly 200 years, it has been viewed as a preeminent medical journal for original research, review articles, and case reports.

The NEJM was among the first medical journals to communicate its research articles using Web 2.0 tools such as podcasts and really simple syndication (RSS) feeds. Each week it offers 2 podcasts, one about authors who discuss their

■ **Table 1**
Popular Sites With Web 2.0 Features

Web Site	Address	Purpose
Bloglines	http://www.bloglines.com	Aggregating news and research
Delicious	http://delicious.com	Web site tagging
Facebook	http://facebook.com	Social networking
SlideShare	http://slideshare.net	Finding presentations (some audio)
Twitter	http://www.twitter.com	Sharing ideas now
Wikipedia	http://wikipedia.org/	Encyclopedia
YouTube	http://www.youtube.com/	Video snippets

■ **Table 2**
Some Top Medical Sites That Use Web 2.0 Technology

Web Site	Address	Purpose
AskDrWiki	http://askdrwiki.com	Medical encyclopedia
British Medical Journal	http://bmj.com	General medical journal
Clinical Cases and Images Blog	http://casesblog.blogspot.com	Medical blog
Connotea	http://www.connotea.org	Reference manager
Ganfyd	http://www.ganfyd.org	Medical encyclopedia
Health Education Assets Library (HEAL)	http://www.healcentral.org	Digital library
Labmeeting	http://www.labmeeting.com	Share scientific papers
MedEdPortal	http://www.aamc.org/mededportal	Educational resources
New England Journal of Medicine	http://nejm.org	General medical journal
ScienceRoll blog	http://sciencerooll.com	Medical blog

published research and another that summarizes articles in the current issue. Other features include Videos in Clinical Medicine (videos of medical procedures), a weekly Image Challenge, and the new NEJM Beta site (<http://beta.nejm.org/>), an experimental Web 2.0 learning space for readers "...to pursue new ideas in publishing and showcase innovative ways to present information for use in medical education, research, and clinical practice."

Pathology and Laboratory Medicine: Still Web 1.0?

Many Web sites cater to the interests of pathologists, whether in private practice or academia.¹⁰ Professional organizations allow members to read about what the organization is doing, pay their annual dues, find out who is running committees, and access a range of educational materials. University departments provide information on their educational programs (and how to apply), faculty members, and research opportunities. Some departments also have collections of images demonstrating gross and microscopic findings, as well as case studies. Government agencies offer everything from research funding to specialized diagnostic services. Short descriptions of Web sites representing each category are given in the following sections. Most of these sites would be considered Web 1.0 because enhanced communication among users is not central to their mission. In addition, Web site content is available to all but still controlled by editors and owners.

American Society of Hematology Image Bank

This image bank (<http://ashimagebank.hematologylibrary.org/>) houses a collection of annotated photomicrographs, pictures, and illustrations in hematology. Content is arranged into normal and pathologic conditions of bone marrow, lymph nodes, and spleen; lymphoid and myeloid neoplasms; RBCs and WBCs; the coagulation system; and transfusion.

Bethesda System Web Site Atlas

The Bethesda System Web site atlas (<http://nih.techriver.net/>) is a searchable atlas of about 350 annotated cytology images, most from cervical/vaginal preparations. Some of the images were included in the Bethesda Interobserver Reproducibility Project. Histograms showing the distribution of interpretations for these images are presented on this Web site.

Division of Parasitic Diseases, Centers for Disease Control and Prevention

This government-sponsored site (<http://www.dpd.cdc.gov/DPDX/Default.htm>) contains descriptions of parasites, their life cycle and geographic distribution, and an image

library. Information on how to collect, process, and examine specimens for parasites is also provided.

Lab Tests Online

This peer-reviewed site (<http://www.labtestsonline.org/>) contains general information on clinical laboratory testing and structured articles on more than 230 tests and 100 conditions and diseases. News articles about recent developments in laboratory testing are featured on the home page. The site is geared to the general public but is also used by health care professionals.

Pathology Education Instructional Resource

A resource for faculty and students at the University of Alabama is found at <http://peir.path.uab.edu/>. It has a digital library with more than 40,000 images, educational materials that include case studies and learning modules with pretests and posttests, and links to useful Web sites for pathology residents and fellows.

United States and Canadian Academy of Pathology

The United States and Canadian Academy of Pathology Web site (<http://www.uscap.org>) contains materials from presentations given at annual meetings (2002-2009), searchable by organ system. The "virtual slide box" presents unknown cases containing microscopic images, clinical history, answers, explanatory text, and references.

Web 2.0 and the Future of Pathology and Laboratory Medicine

How might Web 2.0 technology enhance practice within our field? Here are some possibilities.

Communities of Practice

Pathology encompasses a wide spectrum of practices from examination of tissue to measurement of cells and molecules in biologic fluids. Experienced pathologists can diagnose most of the cases they receive with little or no difficulty. However, a few cases fall outside of previous experience and do not conform to textbook descriptions or the latest continuing medical education (CME) course they attended. For pathologists who need access to additional expertise, self-organizing online communities of practice would provide a forum for sharing difficult and/or interesting cases.

High-resolution digitized images of tissues and body fluids are easy to produce and store. A Web site containing representative gross and microscopic images from unsolved cases would enable pathologists from across the globe to review the material and offer their comments. Unless the disease or its presentation is truly new, someone must have seen it before.

The same logic holds for numeric and graphic data, which are the usual outputs of chemistry and hematology sections. Online communities of practice would allow pathologists to select their colleagues from across the country (or beyond), rather than by geographic proximity.

Continuing Education

The need to stay current with new developments and to emphasize core knowledge in the field is the *raison d'être* for CME. In fact, state medical boards, hospitals, and professional certifying agencies expect pathologists to show evidence of keeping up. Most CME is organized around formal presentations given by acknowledged experts, often in desirable destinations away from home. The content and format are selected by the presenters who should know what the participants need to learn. It sounds easy—and painless.

Unfortunately, work schedules and real life may interfere with these professional getaways. An alternative for office-bound pathologists is electronic delivery of CME. Teleconferences and self-contained learning modules can be accessed over phone lines and the Internet. Many of these programs are archived for on-demand delivery to desktops and mobile devices. A key element of this delivery is the ability to select shorter programs (typically 1 hour) that meet learner needs in a highly focused area rather than spending 3 days surveying the gastrointestinal tract from salivary gland to anus. CME may ultimately become entirely self-directed with instructional modules available anytime and anywhere from an iTunes-style online store.¹¹

Electronic CME may still be regarded as a solitary activity because interaction with other human beings is not required. A more collective approach would be to create a detailed and sophisticated pathology version of Wikipedia.¹² The pathology equivalent could contain articles on diseases, diagnostic tests, analytic instruments, and anything else deemed important by the self-appointed editors of the site. Beyond the standard descriptions that are found in most textbooks, each article could link to image libraries or tables of chemical and hematologic results that display the breadth of findings in a given disease. A pathologist examining a difficult slide or wrestling with a set of laboratory results could obtain relevant continuing education almost immediately with several mouse clicks (and afterward she could silently thank her colleagues for contributing to this effort).

Publication

For authors, publication can be a lonely endeavor, a 1-way communication process to an audience that may not be listening. And what about the readers: Do they agree or disagree with the ideas expressed in the article? Perhaps they want to share their own data, opinions, or experiences with the authors. By hosting a chat room for published articles, print

and electronic journal publishers can encourage discussion about new ideas and research findings in real time. In this open environment, some “rules of the road” may be needed to filter out rude or personal comments. Or readers can wait for the flurry of letters to the editor, which will appear in 6 months. Is your attention span that long?

Authority, Confidentiality, and Security in a Web 2.0 World

The technology to develop Web 2.0 applications has been available for some time. However, there are legitimate concerns about how these information technologies will be used and whether they will benefit the pathology community. These concerns lead to some important questions: (1) How can we ensure content accuracy on shared Web sites if anyone can alter what is there? (2) Will contributors get credit and recognition for their work? (3) Does the anonymity of electronic communication diminish or enhance collegial interaction? (4) Will the role of experts be diminished in a Web 2.0 environment? (5) How will patient confidentiality be assured? (6) Are pathologists sharers or hoarders of information?

The answers to these questions (and many others that need to be considered) will determine whether and how Web 2.0 technology is adopted by the field. For an excellent discussion of issues raised by the introduction of Web 2.0, see the article by McGee and Begg.¹³

Conclusion

Any review of Web 2.0 is a close look at how we are doing things in the new digital world. The judicious application of this technology in our work lives could, as the Japanese proverb suggests, make all of us a bit smarter.

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